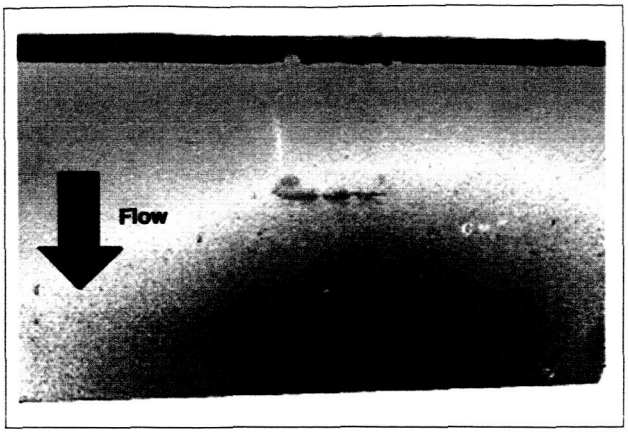

Fig. 1. PSP data on upper surface at 8 deg pitch angle (steady).

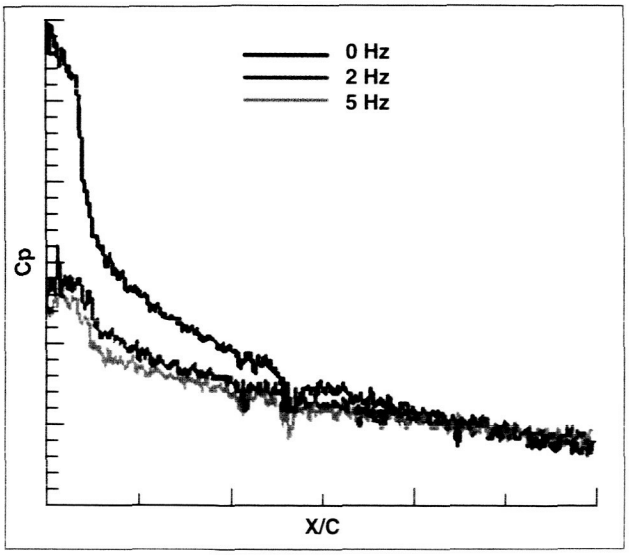

Fig. 2. Comparison of PSP-derived pressure distributions: steady (0 Hz) versus unsteady (2, 5 Hz).

Reformulated versions of the ISSI paint are currently being prepared. A new oscillating airfoil is being fabricated which contains unsteady pressure transducers for direct comparison with the PSP data. New flash units have been obtained which will provide higher brightness with a much shorter flash duration. A second round of testing is to be conducted.

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Distributed Remote Management of Aerospace Data

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The DARWIN system provides web-based remote access to the integrated knowledge generated from advanced wind-tunnel instrumentation suites and by sophisticated numerical simulation codes. Every year at Ames Research Center, these independent sources generate large volumes of high-quality data on flight vehicles. However, these data are only valuable to the design process if they can be readily accessed, analyzed, and applied by aerospace engineers. The DARWIN system has been developed in conjunction with new computational and experimental test technologies to enhance design-cycle productivity by providing design engineers with faster and better access to these valuable data.

DARWIN allows engineers to securely access and analyze these aerospace data from remote locations. Once engineers have been provided with a DARWIN account, they can use a web browser to visit the DARWIN secure web site and log in. The DARWIN web pages present data from only those tests for which users have been granted access (see figure 1). After logging in users can browse through the tests or query the database for specific information. Data from wind tunnel tests in progress can be viewed on a "live" screen that updates its displays in near real time to reflect the most recent results. Both live and archival data are displayed in user-configurable tables and plots. Once the user has retrieved a set of data and adjusted the tables and plots as desired, the work can be saved as a DARWIN data set. All the user's data sets are stored in a hierarchical "folder tree," which operates similarly to a Macintosh or Windows desktop. The user can add or delete DARWIN data sets, post files (such as text documents or spreadsheets or images), make links to other web sites, and create folders to organize them all. Unlike a PC, however, the folder tree is available to the user via a web browser from whatever machine and location the user chooses.

DARWIN has been deployed at Ames since 1997 as a tool for remotely accessing wind tunnel data. It has been popular with engineers for its live monitoring capabilities and its cross-test comparison features.

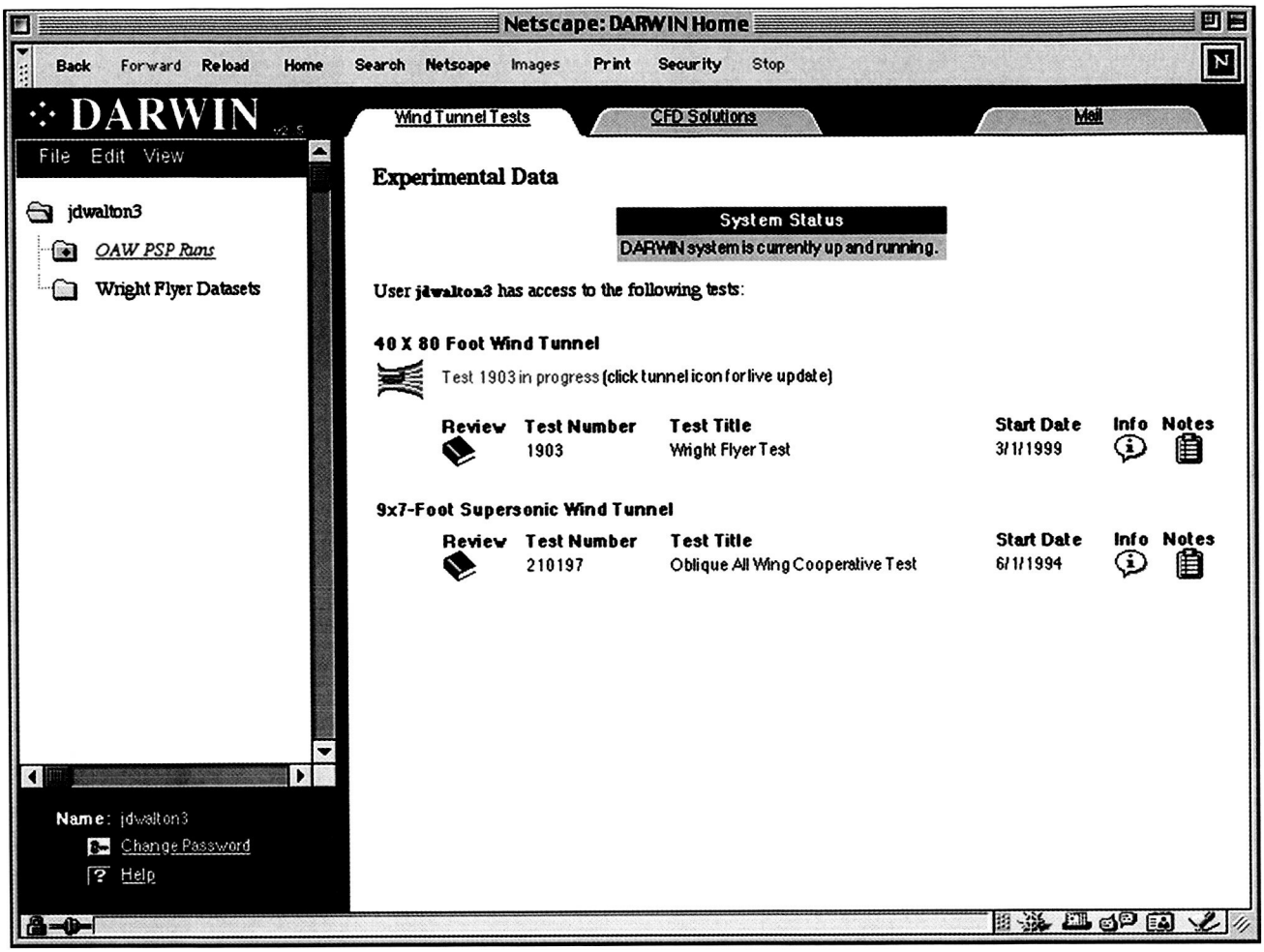

Fig. 1. The DARWIN web application.

In 1999 significant advances were made in broadening the DARWIN system to capture the results of computational fluid dynamics (CFD) simulations as well as test data from the tunnels. A major limitation of the system was its restriction to 241 variables, 31 of which were fixed and always required. Although these variables were pertinent to certain types of wind tunnel tests, they were not always germane to CFD results or to spacecraft models. Thus, the first major step in this process was redesigning the DARWIN database so that it could capture any type and number of variables associated with the data. The user interface software was rewritten to take advantage of the new database model and to provide displays that were custom-tailored to CFD requirements. The second step involved generalizing the DARWIN loading routines to accept input files from a variety of systems, not just from the Ames wind tunnels. With these advances in place, DARWIN is well on its way to becoming a general data management tool for the Aero-Space Enterprise.

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